

IMMUNIZATION PROCEDURES*

REPORT OF THE COMMITTEE

By E. B. SHAW, M.D.

San Francisco

PAUL HAMILTON, M.D.

Alhambra

AND

H. E. STAFFORD, M.D.

Oakland

YOUR committee, in formulating this report, has restricted itself to a consideration of active immunization; those methods which are utilized in health for the production of a permanent or semi-permanent resistance to a specific infection. These procedures have been divided into (1) those of proven value which should routinely be done; (2) those which may be done for special indication; (3) those in which available evidence indicates that they should not be used.

I. PROCEDURES WHICH SHOULD ROUTINELY BE PERFORMED

Every child should be vaccinated against smallpox and immunized to diphtheria.

Smallpox Vaccination.—Smallpox vaccination should be performed at an early age and is ideal at six months. Between six months and two years of age, reactions to vaccination are minimal, and there is practically no danger of postvaccinal encephalitis. Vaccination should preferably be performed on the arm after thorough cleansing of the skin. There is less risk of infection in arm vaccinations, and if the site chosen is the posterior medial aspect of the upper arm, the resultant scar is extremely inconspicuous. In girls, great care should be taken to place the vaccination well out of sight under the arm. There are several methods of vaccination, but the best consists of placing a drop of glycerinized virus at the prepared site, and making several tangential strokes into the skin through the drop of virus. A single puncture will often produce a successful vaccination, and no more than ten strokes is necessary for first vaccination. It is permissible, perhaps preferable, to apply no dressing whatever; but the vaccination may be very lightly covered by several thicknesses of gauze which are loosely affixed to protect against scratching by the child. The vaccination should be inspected and dressed in one week, at which time the application of a mild antiseptic, such as tincture of merthiolate, helps to cut down subsequent infection. It is important that tight dressings of any kind be absolutely avoided.

Revaccination should commonly be done when the child first attends school, or when epidemics occur, and at intervals thereafter of from five to seven years. Revaccinations should be inspected in forty-eight hours in order to observe the accelerated take which is evidence of immunity. A vaccination which shows no reaction of any kind, either

at forty-eight hours or at one week, does not indicate that the patient is immune to smallpox. All considerations of safety indicate that first vaccinations should be done in infancy, and not be deferred until school attendance.

Diphtheria. There are several satisfactory methods of producing immunity, but three injections of formolized toxoid give such excellent immunity that it is the method of choice. Two injections of $\frac{1}{2}$ and 1 cubic centimeters, at three or four-week intervals, give nearly as good results. As a public health procedure, the percentage of immunity is so high it is not necessary to confirm it by the performance of a Schick test; but in private practice it is better to demonstrate immunity by a Schick test done three to six months after immunization.

Alum toxoid, in a single dose, does not give a corresponding degree of immunity, and repeated doses of alum toxoid have no advantage over formolized toxoid. A single dose of alum toxoid, followed by a dose of formolized toxoid in three or four weeks, is an acceptable procedure, and has some advantage in the speed with which some degree of immunity is produced. Toxin-antitoxin mixture is much less effective, but may be used in adults or older children who react to ordinary toxoid. The preferable method, however, of immunizing older children and adults is by the use of a series of smaller doses, beginning with 0.1 cubic centimeter, avoiding severe reactions and cautiously increasing the dosage. Three injections of 0.1, 0.2, 0.2 will frequently produce immunity, but the average adult may have the dosage increased, with an eye to the resultant reactions, and be given 0.1, 0.25, 0.5, and a final dose of 1 cubic centimeter, with the production of a high degree of immunity and no severe reaction.

Diphtheria immunization should routinely be done near the end of the first year of infancy, and should not be deferred until first school attendance. In infancy the immunity response is excellent and is better maintained; reactions are slight or nil, and protection is thereby secured through the early years of life when the hazard of the infection is greatest.

Schick Test. The Schick test is performed by injecting 0.1 cubic centimeter of a ready diluted toxin in peptone buffer intradermally into the skin of the forearm. The test is read in forty-eight to seventy-two hours; an area of redness greater than 0.5 centimeter in diameter denotes susceptibility. In small children, pseudoreactions are encountered very infrequently.

Diphtheria immunity is a relative, and not a "solid" immunity; but the universal performance of immunization affords tremendous protection against diphtheria.

II. PROCEDURES WHICH SHOULD BE DONE FOR SPECIAL INDICATIONS

1. **Typhoid Vaccination.** The injection of typhoid vaccine, in the usual series of three doses of the available vaccine, produces an active immunity which is fairly reliable for one to three years. The

* Report submitted by Special Committee to the Pediatric Section of the California Medical Association at the sixty-seventh annual session, Pasadena, May 9-12, 1938.

dosage need not be much reduced for small children, and reactions in the young are minimal. In the average urban community public health safeguards afford sufficient protection against typhoid. Immunization should be practiced in any community in which the hazard of typhoid exists, or among those entering such a district.

It is impossible to make any test of the immunity conferred against typhoid.

2. *Whooping Cough.* There is evidence that some degree of protection is conferred against whooping cough by the injection of properly prepared Phase I vaccine. The degree, duration, and potential value of this method have not as yet been definitely demonstrated, and the occurrence of known occasional failures indicates the necessity for a critical point of view, and renders it unfair and unwise to promise too much to the parents regarding the immunity produced. Immunization, in order to be useful, must be given early in life, may be begun as early as the third month of life, and, if used as a routine, should not be deferred later than the fifth to seventh month, so that protection may be secured during the time of greatest hazard. There are several preparations of whooping cough vaccine which may be used, but injections should be given at weekly intervals with the administration of a total dosage of 80 to 100 billion organisms.

3. *Scarlet Fever.* Opinion varies regarding the precise value of this immunization. Reactions to the injections are sometimes unpleasant and the necessity for five doses is disadvantageous. The procedure is somewhat more unpleasant, and somewhat less effective, than diphtheria immunization, and the degree and duration of immunity are less certain.

Susceptibility to scarlet fever is in general indicated by a positive Dick reaction. This test is performed by the intradermal injection of 0.1 cubic centimeter of Dick test toxin, prepared for this purpose; an area of redness of 0.5 centimeter or larger at the end of twenty-four hours indicates susceptibility. After immunization, the presence of a negative Dick test should always be ascertained.

The immunizing dosage consists of five weekly doses of scarlet fever toxin, prepared for this purpose and consisting of 500, 800, 2,000, 8,000, 80,000 units.

The committee feels that scarlet immunization should especially be used for the protection of nurses and attendants in hospitals, or for other conditions where unusual hazard of infection exists. It does not recommend that scarlet immunization be generally employed as a public health or school health procedure, or used routinely in private practice.

4. *Tetanus.* A degree of immunity against tetanus is produced by the injection of 0.5, 1, and 1 cubic centimeter of tetanus toxoid at weekly intervals. This is not recommended as a routine procedure, but only under special conditions of exposure. This method should not be instituted

under conditions which call for the prophylactic use of tetanus antitoxin.

5. *Rabies.* Active immunization should be attempted only following known or suspicious exposure by dog bite. Either Semple or Cummings vaccine may be used in fourteen or twenty-one doses, but in all suspicious bites about the head and face, or in young children, twenty-one injections should invariably be employed. One per cent procain or novocain, intradermally and subcutaneously at the site of injection, does much to reduce the resultant discomfort.

It is important to mention that cauterization with fuming nitric acid is by far the most effective agent which can be used in addition to active immunization.

III. METHODS WHICH SHOULD NOT BE EMPLOYED

The committee is of the opinion that methods proposed for the production of active immunity against poliomyelitis and tuberculosis contain potential dangers and experimental pitfalls which contraindicate their routine use in private practice.

IV. ADDITIONAL COMMENTS

The committee considers there is no proven agent for the production of active immunity against epidemic encephalitis, erysipelas, epidemic meningitis, epidemic parotitis, pneumonia, measles, or varicella.

The precise utility of respiratory vaccine for the prevention of the common cold, recurrent sinus and upper respiratory infections defies precise scientific definition. The immune response which follows the injection of respiratory vaccine cannot be demonstrated in the test tube, and has not conclusively been proved by controlled clinical experiments. The use of this vaccine is widely, and at least harmlessly, employed, and by men of unquestioned scientific attainments. The committee feels that the demonstrable utility is likely to be limited to the treatment of the allergic individual whose "colds" are on an allergic background.

CONCLUSIONS

There are a limited number of things which should be done to the average well child. Only those things which are unfailingly useful, safe, and effective should be advocated routinely. Those whose status is less conclusively proven should not be employed without their limitations being carefully explained. Most "immunization campaigns" undesirably emphasize the performance of immunization at school age. The importance of smallpox and diphtheria immunization in infancy should constantly be emphasized, and if anything is to be accomplished by whooping-cough immunization this should also be done in early infancy.

Your committee has made free use of a similar report recently issued by a committee of the American Academy of Pediatrics.

384 Post Street.

248 East Main Street.

2940 Summit Street.